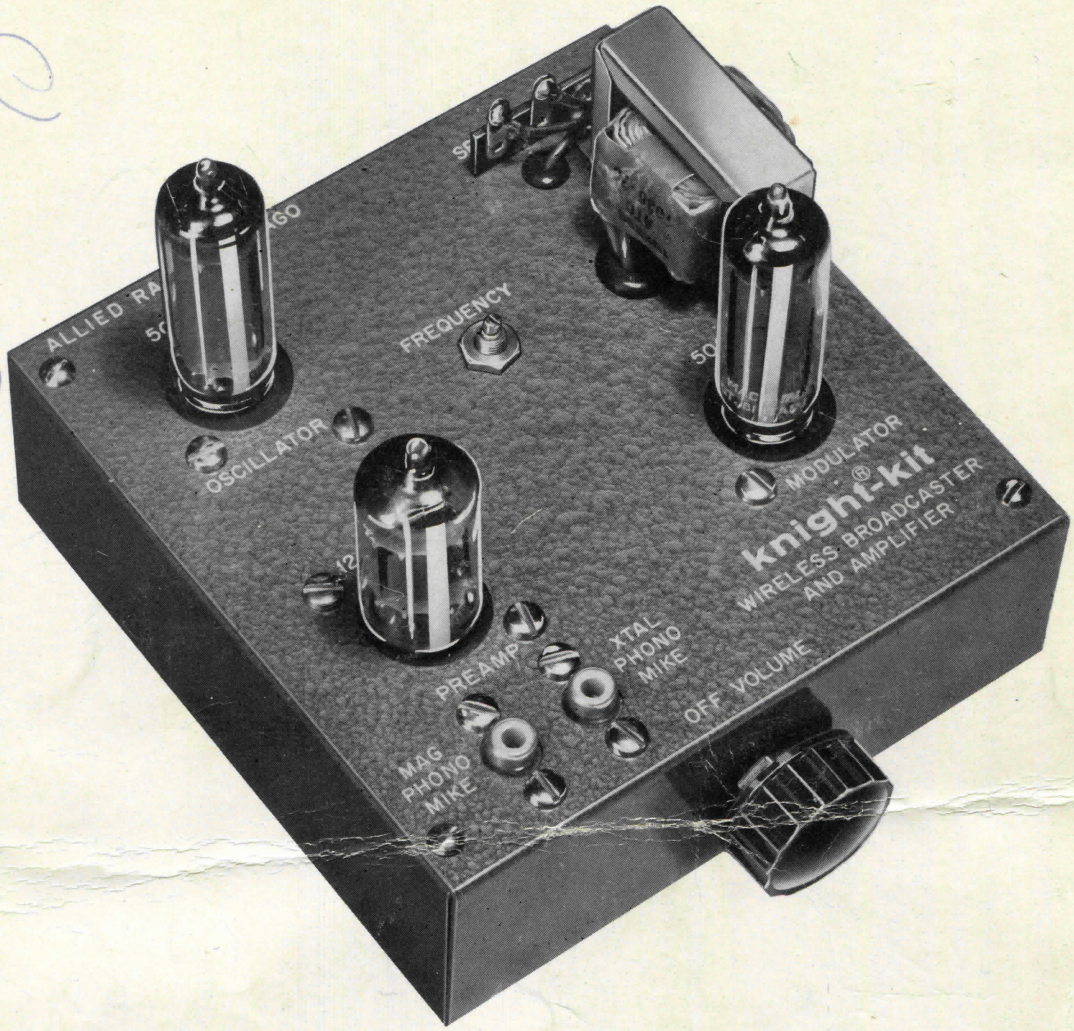


WIRLESS BROADCASTER-AMPLIFIER

83 Y 706

ASSEMBLY MANUAL

A PRODUCT OF ALLIED RADIO · CHICAGO

knight-kit

knight-kit

WIRELESS BROADCASTER-AMPLIFIER

INTRODUCTION

The Wireless Broadcaster-Amplifier takes only a few hours to build, but has many uses in home entertainment. It can be connected to a record player or microphone, to send programs out to any number of standard radios in the house. Or it can be used as a complete preamplifier and amplifier with any record-player cartridge. One input takes ceramic or crystal cartridges and microphones; the other takes magnetic cartridges and microphones. The high-gain circuit provides plenty of amplification, even for low-level magnetic cartridges.

As a Broadcaster, this kit has many practical applications, since it will broadcast music from a single record player to as many radios as you like, located any place in the home. For party fun it's hard to beat — imagine the effect of a radio-broadcast made in your own voice — with your own words! The broadcaster can be tuned to come in at any desired point on your radio dial, from 600 kc to 1500 kc.

Terminals are provided for connecting a speaker directly to the Amplifier, so the record or microphone can be heard at the unit itself. An inexpensive, binaural effect can be achieved by broadcasting music to the radio, and playing it through the Amplifier speaker at the same time. Practically any PM speaker can be used, since the Amplifier matches the most popular speaker impedances, from 3.2Ω to 16Ω.

All under the chassis wiring is completely enclosed and rubber feet are supplied so the unit can be used on top of any furniture piece. AC leakage from chassis to ground is well within Underwriters Laboratories specifications. The finished unit can be proudly displayed — or if concealed location is preferred — it's small enough to fit most anyplace.

CHECKING YOUR KIT

Before starting to build, check each part against the parts list on page 16. This will help you become acquainted with each part. If you are unable to identify some parts by sight, locate their pictures on the wiring diagrams.

Symbols are used to describe parts. The Greek letter "μ" means micro, "Ω" means ohm, "K" means one-thousand, and M (or meg) means one million. Ten-percent tolerance resistors are used throughout, as shown by the fourth color band (silver) on each resistor.

The screws used are all 6-32 x 5/16" except four #4 self-tapping screws which will be specified.

CONSTRUCTION AND WIRING HINTS

The only tools necessary for building your Wireless Broadcaster-Amplifier are: A pair of long-nose side-cutting pliers, a screwdriver, and a soldering iron. Additional tools that simplify construction are a pair of diagonal cutters and a small screwdriver.

Study the pictorial diagrams and note how the parts are mounted. These pictorial diagrams show the actual location of all parts and wires. The schematic diagram, which is located at the back of the book, shows how the parts are connected electrically, and is helpful in understanding how the circuits work.

Be sure to follow the step-by-step instructions exactly. DO NOT wire this kit from the pictorials or schematic diagram alone, as it must be assembled and wired in a definite sequence. Occasionally, several parts are mounted with the same hardware, so be sure that you read each step all the way through. For your convenience, space is provided to check off each step after you have completed it.

Make good mechanical connections at solder points, clean metal to clean metal. Loop wires around socket and connection terminals, and clamp tightly to assure good mechanical connections. See Figure 1.

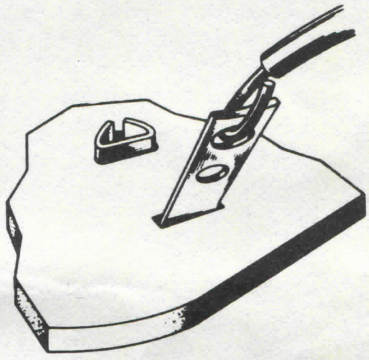


FIGURE 1. HOW TO CONNECT A WIRE TO A TERMINAL

Unless otherwise stated, all the leads on the resistors, capacitors, and transformers should be as short as possible. Figure 2 illustrates the best way to connect a component. As shown, the end leads should be pulled through the terminals so that the part is tightly mounted. After a lead is pulled through a terminal, bend it around the terminal and cut off the excess wire.

The insulated wire furnished with this kit is cut to length, and the ends are stripped. Each different colored wire is a definite length, so be sure to use the color specified in each of the wiring steps. A piece of bare wire is included. Whenever it is necessary to use some of it, the exact length is specified.

The flexible tubing supplied is called "spaghetti". Spaghetti is used to cover the bare end leads of some of the parts where there is a chance they will touch other bare wires or the chassis.

THIS KIT MUST BE *PROPERLY* SOLDERED!

WITHOUT GOOD SOLDERING, AN ELECTRONIC UNIT WILL NOT WORK . . . just as a suit of clothing will fall apart if the stitches are loose . . . no matter how excellent the material.

USE ENOUGH HEAT

This is the main idea of good soldering. The purpose of soldering is to join metal parts, making an UNBROKEN metal path over which electricity can travel. To do this you must apply enough heat to the metal surfaces to make the solder spread freely on them, until the contour (shape) of the connection shows under the solder. If the solder barely melts and forms a rounded ball, *you are not using enough heat.* If you do not use enough heat, there may be no electrical connection, although it appears soldered.

USE ONLY ROSIN CORE SOLDER

We supply the right kind of solder *(rosin core solder).* Do not use any other kind of solder! USE OF ACID CORE SOLDER, PASTE, OR IRONS CLEANED ON A SAL AMMONIAC BLOCK WILL RUIN ANY ELECTRONIC UNIT AND WILL VOID THE GUARANTEE.

USE A 100-WATT IRON

A 100-watt soldering iron with a clean, chisel-shaped tip will supply the right amount of heat when used correctly. Notice how the iron is held in the picture. Heat the iron for 10 minutes before you start soldering. Keep the tip brightly coated with solder. When necessary, wipe the hot tip clean with a cloth. (If you use a soldering gun, be sure the tip reaches full heat before you solder.)

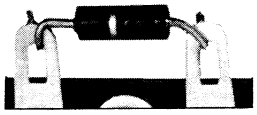
HERE'S HOW TO DO IT . . .

1. Join bare metal to bare metal. Insulation must be removed.
2. Coat the tip of a hot iron with solder.
3. FIRMLY PRESS THE FLAT SIDE OF THE TIP OF A HOT IRON FLAT against the parts to be soldered together. Keep it there while you apply the solder BETWEEN THE IRON TIP AND THE METAL TO BE SOLDERED. Use only enough solder for it to flow over ALL the surfaces of the connection. Remove the iron.
4. DO NOT MOVE PARTS UNTIL THE SOLDER HARDENS. If you accidentally move the wires as the solder is hardening, apply your iron and reheat.

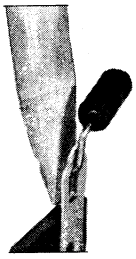
Compare your soldering with the pictures on this page. You have a good connection if your solder has flowed over all surfaces to be connected, following the shape of the surfaces. It should appear smooth and bright.

YOU HAVE NOT USED ENOUGH HEAT: If your connection is rough and flaky-looking, or if the solder has formed a round ball instead of spreading.

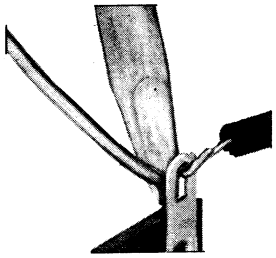
The difference between good soldering (enough heat) and poor soldering (not enough heat,) is just a few extra seconds with a hot iron FIRMLY applied. Remember, larger metal surfaces take a longer time to heat.



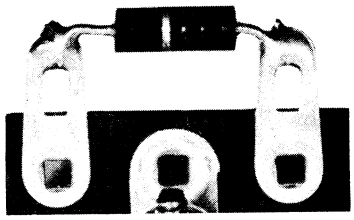
1. Join bare metal to bare metal



2. Press FLAT side of a HOT iron



3. Apply solder BETWEEN iron and connection



Compare your soldering with these pictures.

FIGURE 2. THE ONE-TWO-THREE OF GOOD SOLDERING.

HOW TO CARE FOR YOUR SOLDERING IRON

Your soldering iron is the key to good soldering since it supplies the essential ingredient—HEAT. If the tip is covered by a dirt (oxide) film, the iron will not be able to transfer its full heat. A new tip can be protected from film by coating it with solder the first time it is heated. An old tip should first be cleaned with a file until bare copper is exposed. Then solder-coat it like a new tip.

Never use the iron like a brush—soldering is not a paste-spreading operation. To get the most heat out of the iron, always press the iron firmly to the connection. Hold it so the greatest tip surface is directly in contact with the connection.

MOUNTING THE PARTS

SEE FIGURE 4.

☐ From inside the chassis, scrape the paint from around the large hole that is used to mount the J-2 jack, as illustrated in Figure 3.

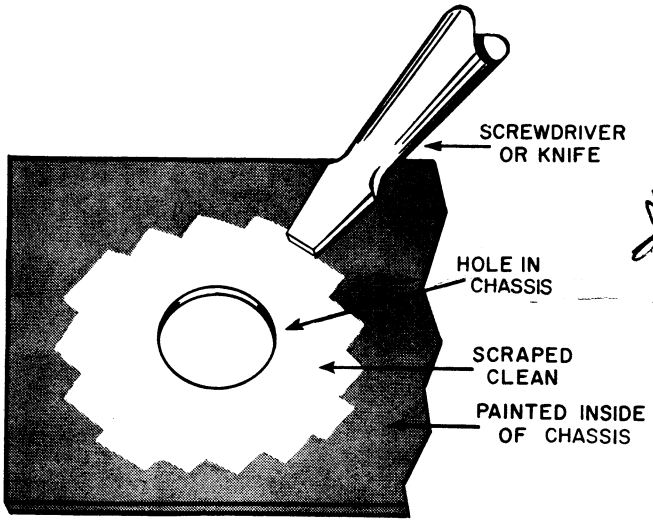


FIGURE 3.
HOW TO SCRAPE PAINT AWAY FROM A HOLE

Mount the following parts **from inside** the chassis.

☐ Mount J-1 and J-2, the two phono jacks. Position them so the short terminal (ground) of one jack is touching the short terminal of the other jack. Use four screws and nuts.

☐ Mount R-9 and S-1, the 500KΩ VOLUME control with the OFF switch, on the front of the chassis. Use a large nut on the threaded bushing before inserting it through the chassis, and another large nut to securely fasten the control to the front of the chassis. The threaded bushing should not protrude past the outer nut on the front of the chassis

☐ Mount C-9, the mica FREQUENCY-CONTROL capacitor, using the nut supplied with the capacitor.

☐ Insert the three rubber grommets — one small grommet and two large grommets.

☐ Mount TS-1, a two-terminal strip, on the rear of the chassis. Use one screw. On the same screw, mount SR-1, the selenium rectifier, and secure with a nut.

☐ Mount TS-3, a three-terminal strip, using one screw and nut.

☐ Mount the 9-pin socket for the V-1 tube. The keyway must be positioned as shown. This is the open space between two of the socket pins. Use two screws and nuts.

☐ Mount a 7-pin socket for V-3, positioning the keyway as shown. Use two screws and nuts.

☐ Mount TS-2, a two-terminal strip, on the rear of the chassis, using one screw and nut.

☐ Mount the remaining 7-pin socket for V-2, positioning the keyway as shown. Use only one screw and nut, leaving the end nearest the keyway free, in position for later mounting.

The audio output transformer, T-1, mounts from the top of the chassis, as shown in Figure 10. The screws used to mount T-1 also mount other parts, so be sure to read the next 3 steps through to the end of each step.

☐ Clip the blue and red leads of T-1 to 3". Remove ¼" of the insulation from the end of each lead. Twist the stranded ends tightly, and coat each end lightly with solder.

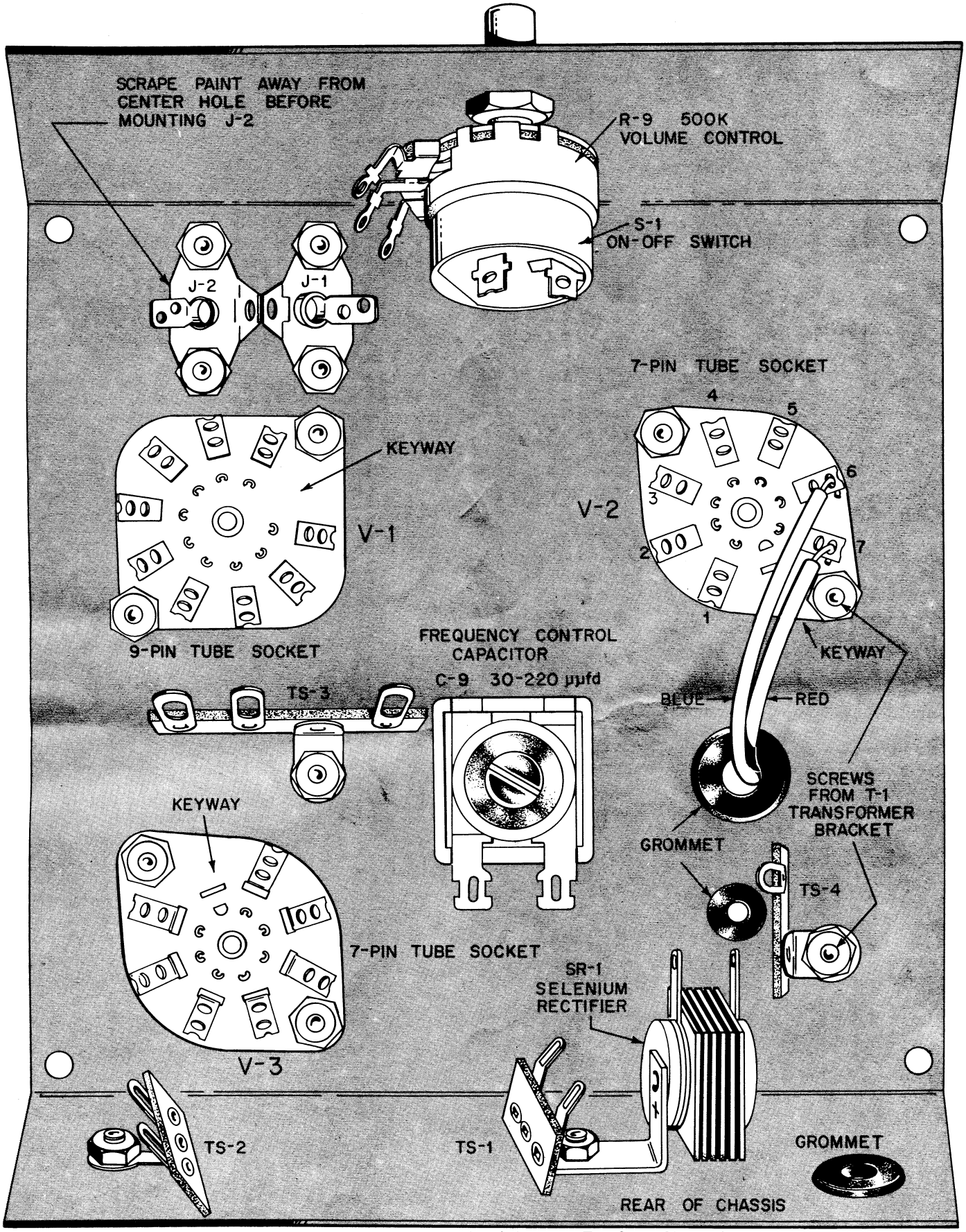
☐ From the top of the chassis, push the blue and red leads of T-1, the audio output transformer, through the large grommet.

☐ Mount one end of the transformer frame and the loose end of the V-2 socket with a screw and a nut. Do not tighten the nut.

☐ Slip the foot of TS-5, a three-terminal strip, under the loose end of the transformer frame. Insert a screw through the frame, through TS-5, and through the matching hole in the chassis. On this screw, from inside the chassis, mount TS-4, the one-terminal strip. Secure in place with a nut. Now tighten both nuts used for mounting T-1.

☐ Connect, but do not solder, the red lead to pin 7 of V-2.

☐ Connect, but do not solder, the blue lead to pin 6 of V-2.



CHASSIS AND TS-1 & TS-2 SHOWN BENT FOR CLARITY
DO NOT BEND CHASSIS OR PARTS.

FIGURE 4. MOUNTING THE PARTS

FIRST WIRING

SEE FIGURE 5.

Wire all parts from inside the chassis.

☐ Connect, but do not solder, one lead of R-5, a 2.7 megΩ resistor (marked with the color bands red, violet, and green) to pin 2 of V-1. Connect, but do not solder, the other lead to pin 8 of V-1.

☐ Connect, but do not solder, one end of a 2" bare wire to pin 3 of V-1. Pass the other end of the wire through pin 8 of V-1, and then connect, but do not solder, it to the short terminals of jacks J-1 and J-2.

☐ Connect, but do not solder, one lead of R-3, a 2.7 megΩ resistor (red, violet, green) to pin 7 of V-1. Connect, but do not solder, the other lead to the short terminals of jacks J-1 and J-2.

☐ **STUDY THE SOLDERING INSTRUCTIONS ON PAGE 3.**

Note there are two tubular capacitors supplied. The one of larger diameter is a dual capacitor, marked 20-20 μfd. The other is a single 20 μfd capacitor. Each has a plus end that may be marked plus(+) or POSitive and a minus end that may be marked minus(−) or NEGative.

☐ Position C-2, the single 20 μfd tubular capacitor, as shown, with the plus (+) end close to TS-3. Connect, but do not solder, the plus lead to terminal 3 of TS-3.

☐ Slip a 1¼" piece of spaghetti on the other lead of C-2. Solder it to the short terminals of J-1 and J-2.

☐ Position C-1, a .01 μfd disc capacitor (may be marked as 10K or 10,000), as shown. Stand the round edge on the bottom of the chassis to keep the leads as short as possible. Solder one lead to pin 7 of V-1. Connect, but do not solder, the other lead to the tall terminal of J-2.

☐ Connect, but do not solder, one lead of R-8, a 47K resistor (yellow, violet, orange) to terminal 1 of TS-3. Push the resistor to the bottom of the chassis. Solder the other lead to pin 3 of V-1.

☐ Cut two 1¼" pieces of spaghetti and slip one on each lead of R-14, a 27Ω 1-watt resistor (red, violet, black). Solder one lead of R-14 to pin 3 of V-3. Solder the other lead to pin 5 of V-1. Be sure the bare lead does not touch the mounting nut on V-1.

☐ Connect, but do not solder, one end of a yellow wire to terminal 1 of TS-3. Connect, but do not solder, the other end to terminal 2 of S-1.

☐ Solder one end of a green wire to pin 4 of V-3. Route the wire as shown. Solder the other end to pin 3 of V-2.

☐ Solder one end of a yellow wire to terminal 4 of V-2. Connect, but do not solder, the other end to the terminal of TS-4.

☐ Connect, but do not solder, one end of an orange wire to the bottom hole in pin 7 of V-3. Solder the other end to terminal 2 of C-9.

☐ Solder a violet wire to the back of terminal 1 of TS-2. Route the wire as shown. Solder the other end to pin 7 of V-2.

☐ Connect, but do not solder, one end of a blue wire to terminal 2 of TS-2. Route the wire along the bottom of the chassis as shown, and push the other end through the small grommet.

☐ Connect, but do not solder, a red wire to pin 1 of V-3. Connect, but do not solder the other end to terminal 1 of C-9.

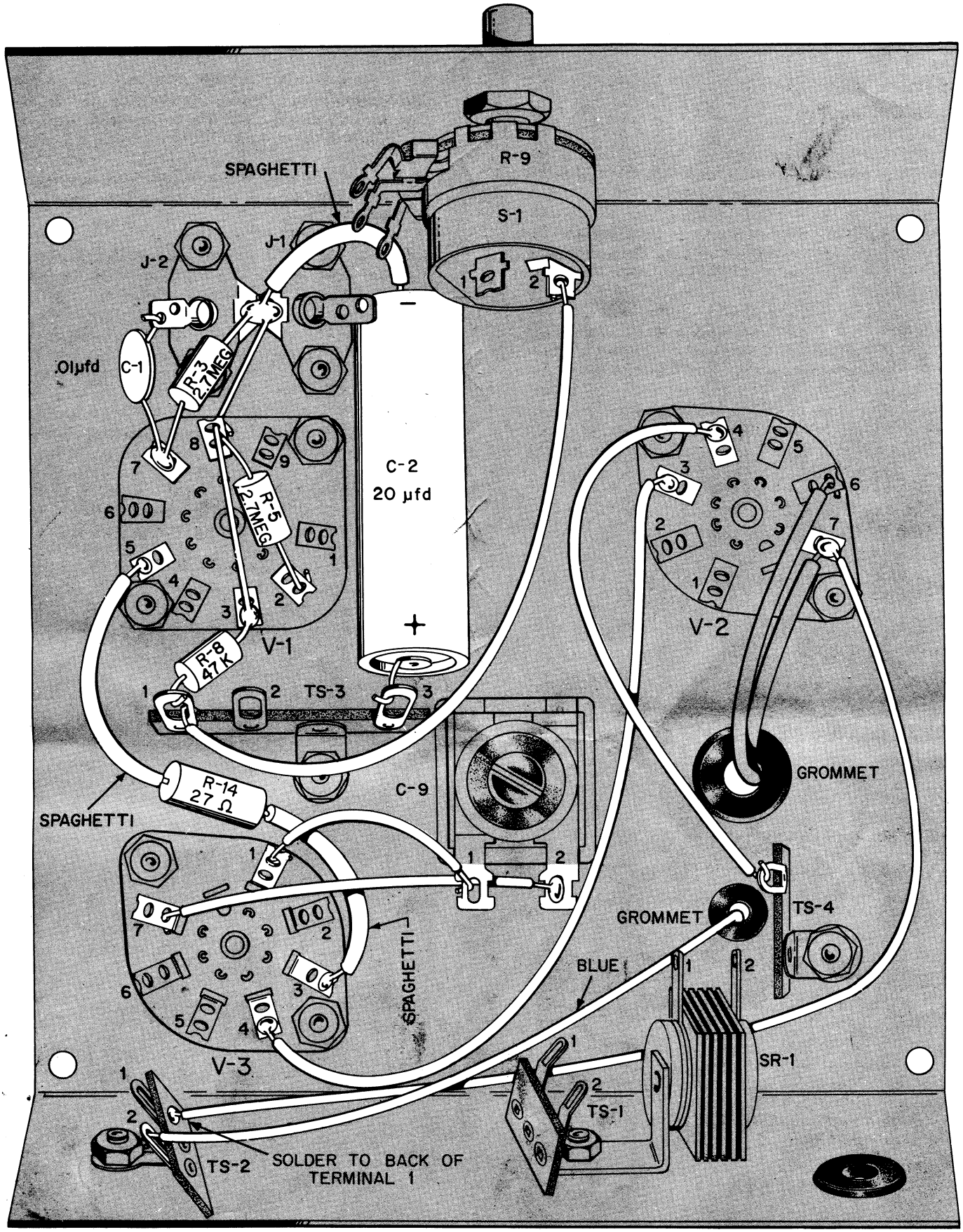


FIGURE 5. FIRST WIRING VIEW

SECOND WIRING

SEE FIGURE 6.

- ☐ Connect, but do not solder, one lead of R-10, a 330Ω resistor (orange, orange, brown) to terminal 2 of S-1. Solder the other lead to pin 1 of V-2.
- ☐ Connect, but do not solder, one lead of R-15, a 33Ω resistor (orange, orange, black) to the terminal of TS-4. Solder the other lead to terminal 2 of SR-1, the selenium rectifier.
- ☐ Solder one lead of R-1, an 820KΩ resistor (gray, red, yellow) to the tall terminal of J-1. Connect, but do not solder, the other lead to the tall terminal of J-2.
- ☐ Solder one lead of R-2, a 22K resistor (red, red, orange) to the tall terminal of J-2. Solder the other lead to pin 8 of V-1.
- ☐ Connect, but do not solder, one lead of C-3, a .0047 μfd disc capacitor (4700 or 4.7K) to pin 2 of V-1. Connect, but do not solder, the other lead to terminal 6 of V-1.
- ☐ Slip 1" of spaghetti on one lead of R-4, a 220KΩ resistor (red, red, yellow). Solder this lead to pin 6 of V-1. Connect, but do not solder, the other lead to terminal 3 of TS-3.
- ☐ Slip ⅜" of spaghetti on one lead of R-6, a 1.5 megΩ resistor (brown, green, green). Connect, but do not solder, this lead to terminal 2 of TS-3. Connect, but do not solder, the other lead to pin 1 of V-1.
- ☐ Slip ⅜" of spaghetti on one lead of R-7, a 220KΩ resistor (red, red, yellow). Connect, but do not solder, this lead to terminal 3 of TS-3. Connect, but do not solder, the other lead to pin 1 of V-1.
- ☐ Solder one end of a 1¼" bare wire to pin 4 of V-1. Connect, but do not solder, the other end to terminal 1 of TS-3.
- ☐ Connect, but do not solder, one end of a red wire to terminal 1 of TS-3. Connect, but do not solder the other end to terminal 1 of V-3.
- ☐ Clip to 1¼" both leads of C-7, a 470 μμfd disc capacitor (.00047). Connect, but do not solder, one lead to pin 5 of V-3. Leave the other lead free for later wiring.
- ☐ Thread one lead of R-12, a 4.7KΩ resistor (yellow, violet, red), through pin 6 of V-3 and connect it to pin 5 of V-3. Solder pins 5 and 6 of V-3. Slip ¾" of spaghetti on the other lead. Solder this lead to pin 1 of V-3. R-12 should be positioned above the edge of the tube socket, so it will not interfere with later mounting.
- ☐ Slip ¾" of spaghetti on one lead of C-8, a 100 μμfd disc capacitor (.0001). Solder this lead to the **bottom** hole in pin 7 of V-3. Solder the other lead to terminal 2 of TS-2.
- ☐ Solder one end of a red wire to terminal 3 of R-9, the 500KΩ VOLUME control. Connect, but do not solder the other end to terminal 2 of the S-1 switch.
- ☐ Solder one end of a yellow wire to terminal 2 of R-9. Solder the other end to pin 5 of V-2.
- ☐ Solder one end of a blue wire to pin 6 of V-2. Route the wire around TS-4 and SR-1, as shown. Connect, but do not solder, the other end to terminal 2 of TS-1.
- ☐ Solder one end of a red wire to terminal 1 of C-9. The other end will be connected later.
- ☐ Bend down pins 2 and 3 of V-3, as shown. Be sure pin 3 does not touch the nut.

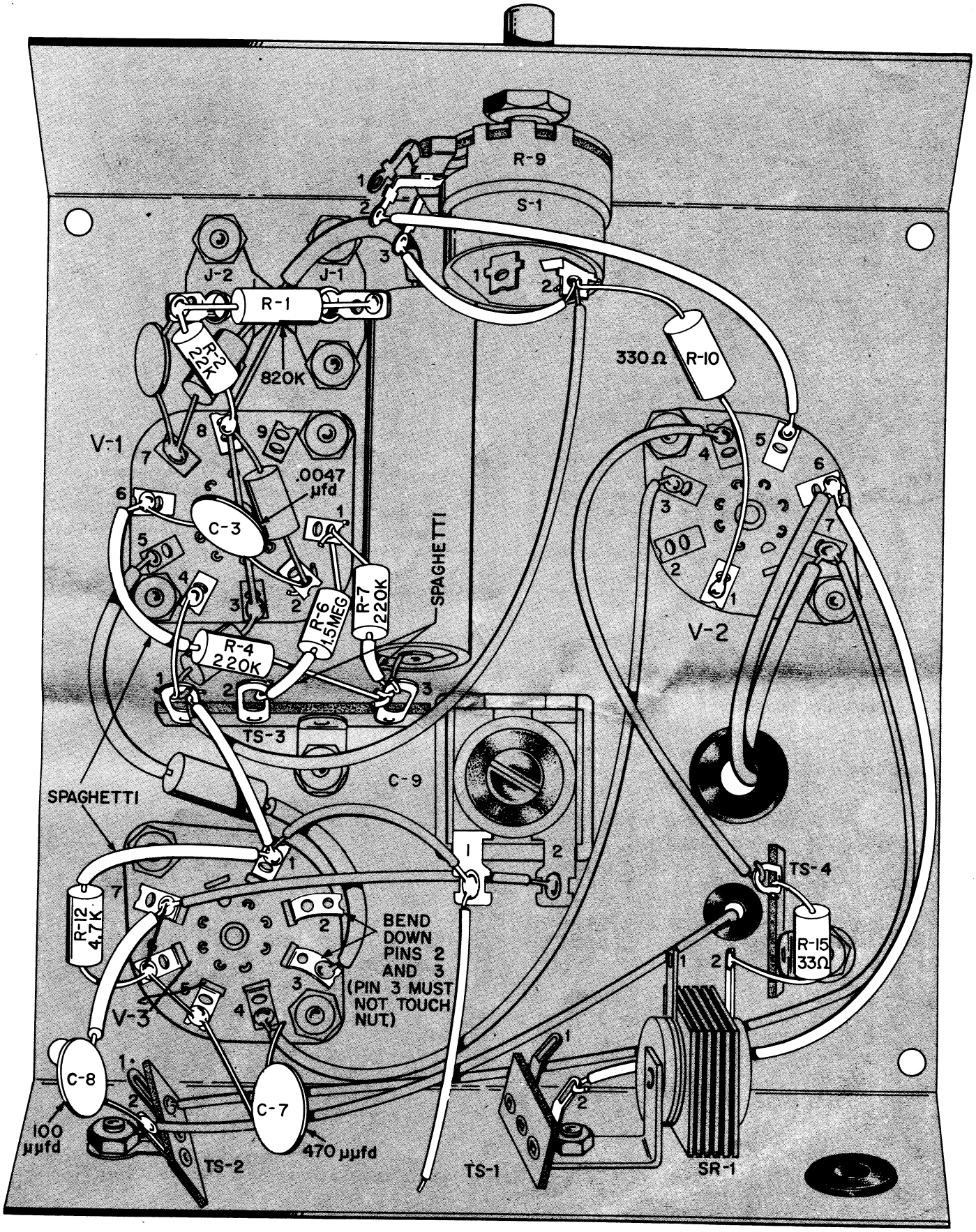


FIGURE 6. SECOND WIRING VIEW

THIRD WIRING

SEE FIGURE 9.

Notice that one end of the L-1 oscillator coil has three terminals. The other end has one terminal with a wire connected to it, plus a blank terminal (without a wire) which is not used. Handle the coil carefully, to protect the windings.

☐ With your pliers, bend the coil terminals as shown in Figure 7.

☐ Melt some excess solder on pin 7 of V-3. Melt a little solder on coil terminal D.

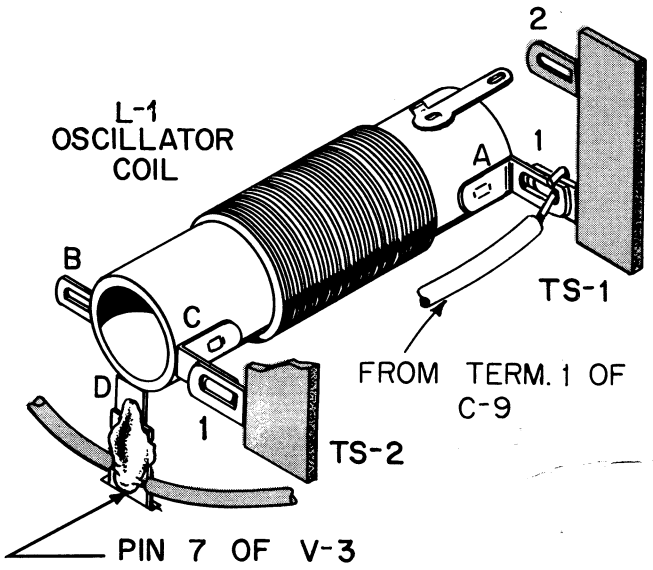


FIGURE 7. MOUNTING THE OSCILLATOR COIL

☐ Hold the coil in position for mounting, with coil terminal D placed against pin 7 of V-3. While holding the coil in position, place your iron against pin 7 of V-3, until the solder flows evenly around terminal and pin.

☐ Connect the red wire, previously soldered to terminal 1 of C-9, to coil terminal A and terminal 1 of TS-1. Solder the wire to both terminals.

☐ Slip ¾" of spaghetti on one lead of C-6, a .0047 μfd disc capacitor (4700 or 4.7K). Solder the lead to terminal 1 of TS-3. (Be sure to solder **all** the wires in the terminal.) Solder the other lead to terminal 1 of TS-2 and coil terminal C.

☐ Solder the loose lead of C-7 to coil terminal B. (The other lead was previously soldered to pin 5 of V-3.)

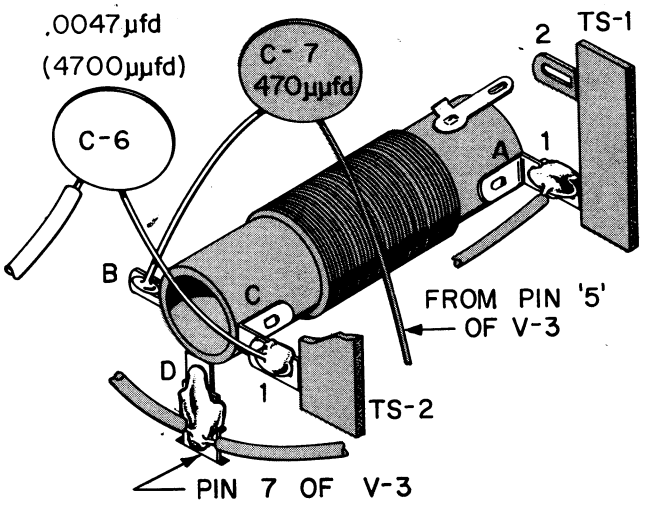


FIGURE 8. WIRING THE OSCILLATOR COIL

☐ Position C-10, the dual 20-20 μfd tubular capacitor, as shown. Be sure the plus (+) end (the end with two leads) is closest to SR-1, the selenium rectifier. Solder the lead from the minus (—) end of C-10 to terminal 2 of S-1. Connect, but do not solder, either one of these plus leads to terminal 1 of SR-1. Connect, but do not solder, the other plus lead to terminal 2 of TS-1.

☐ Solder one lead of R-13, a 1KΩ 1-watt resistor (brown, black, red) to terminal 1 of SR-1. Connect, but do not solder, the other lead to terminal 2 of TS-1.

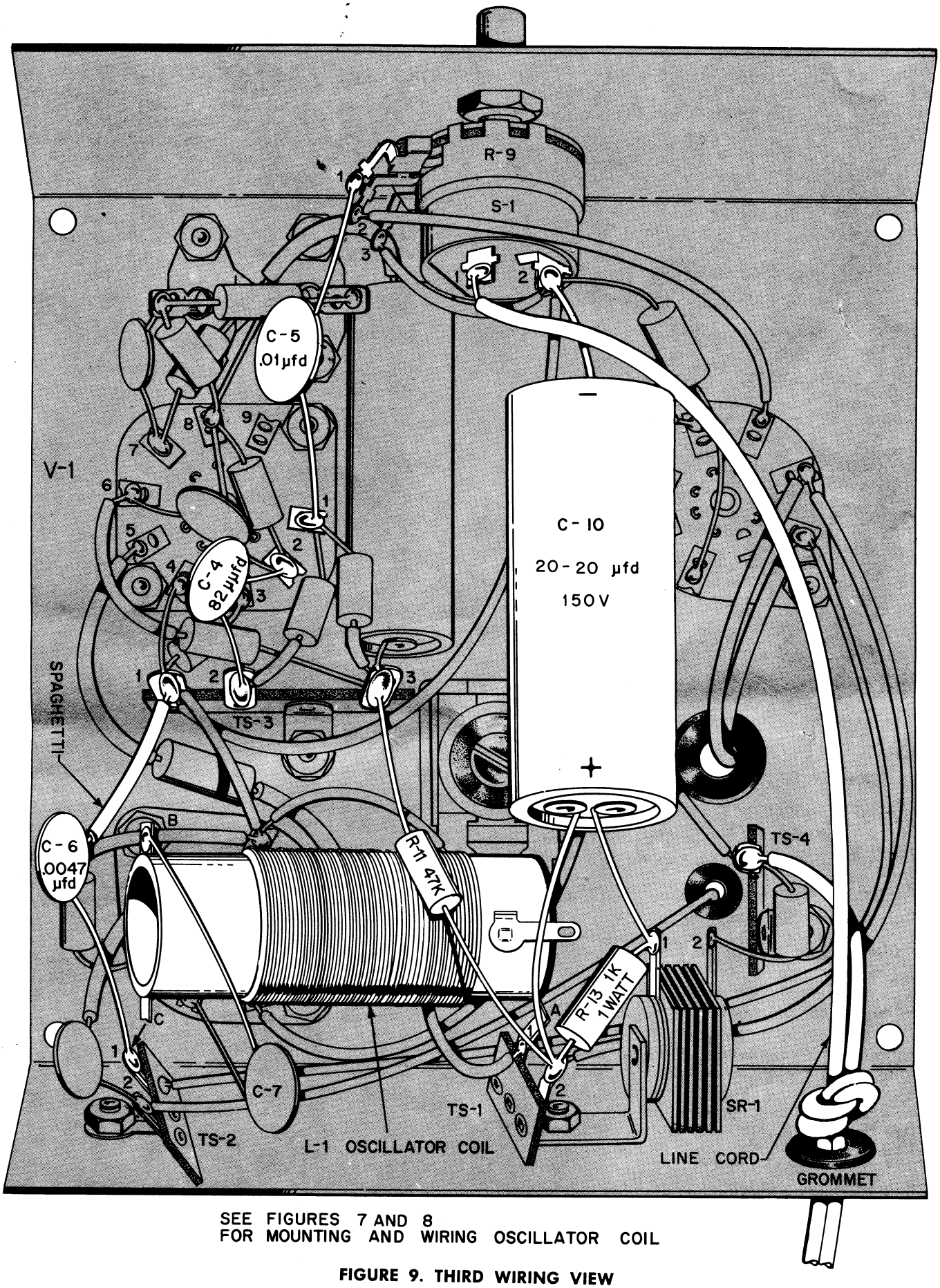
☐ Solder one lead of R-11, a 47KΩ resistor (yellow, violet, orange) to terminal 2 of TS-1. Solder the other lead to terminal 3 of TS-3. Be sure to solder **all** the wires in these terminals.

☐ Solder one lead of C-5, a .01 μfd disc capacitor (10,000 or 10K) to terminal 1 of R-9. Solder the other lead to pin 1 of V-1.

☐ Solder one lead of C-4, an 82 μμfd disc capacitor, to pin 2 of V-1. Solder the other lead to terminal 2 of TS-3.

☐ Insert the bare ends of the line cord through the grommet on the rear of the chassis. Knot the cord so the knot is 5 inches from the bare ends. Split the two sections of the cord back to 1" from the knot. Solder either of the two wires to terminal 1 of S-1.

☐ Trim the other line-cord wire to 2" from the knot. Remove ¼" of the insulation from the end; twist the bare stranded wires together and coat lightly with solder. Solder this end to the terminal of TS-4.



SEE FIGURES 7 AND 8
FOR MOUNTING AND WIRING OSCILLATOR COIL

FIGURE 9. THIRD WIRING VIEW

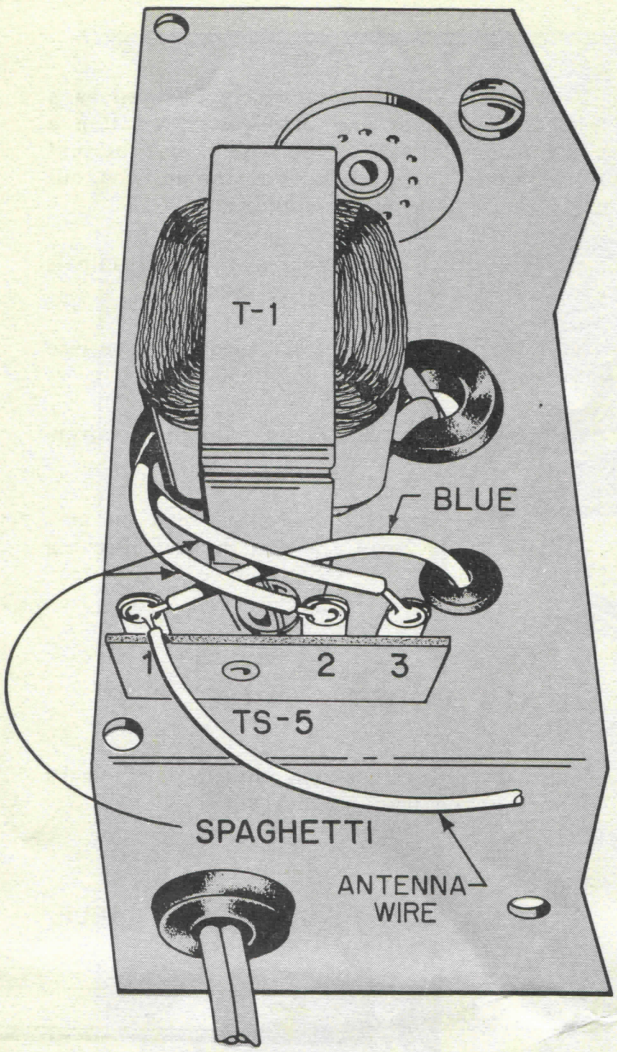


FIGURE 10. FINAL WIRING VIEW

FINAL WIRING

SEE FIGURE 10.

FROM THE TOP OF THE CHASSIS.

☐ Connect, but do not solder, the blue wire coming through the grommet to terminal 1 of TS-5.

☐ Slip a 1¼" piece of spaghetti on the thin lead of T-1 that's closest to TS-5. Solder this lead to terminal 2 of TS-5.

☐ Slip a 2½" piece of spaghetti on the other thin lead of T-1. Solder this lead to terminal 3 of TS-5.

☐ Remove ¼" of the insulation from one end of the 10-ft. coil of antenna wire supplied. Solder this end to terminal 1 of TS-5.

The wiring of your kit is completed.

☐ Check the work. Every connection must be mechanically strong, and all should now be well soldered. A single loose or unsoldered connection will make the unit intermittent in operation or completely inoperative.

☐ Mount the four rubber feet on the bottom cover, using four screws and nuts.

☐ Mount the bottom cover under the chassis. Fasten the cover from top of the chassis with four #4 self-tapping screws.

☐ Place the knob on the shaft of the VOLUME control, R-9, and position so the white dot points to the left-hand corner of the front panel. Tighten the setscrew.

☐ Insert the tubes in the proper sockets. The top of the chassis is marked with the tube number at each socket.

USING YOUR WIRELESS BROADCASTER-AMPLIFIER

You are now ready to use your Wireless Broadcaster-Amplifier. Because it transmits a signal over the air, it must meet the requirements of FCC to be operated without a license. If it is built according to our instruction manual, and not more than 10 feet of antenna is connected, it will meet FCC requirements. The FCC requires that the certification listed on page 15 be attached to your unit. Please cut it out of the manual and paste it to the bottom cover.

Any phono cartridge or microphone can be used with this set. The jack marked MAG PHONO MIKE is for magnetic types; the jack marked XTAL PHONO MIKE is for crystal or ceramic types.

USE AS A BROADCASTER

Your unit acts as a small broadcast station which can be tuned in on your radio. It can be adjusted to operate at any radio dial setting from 600 to 1500 kc. To make these adjustments proceed as follows:

☐ Make a preliminary check by plugging the line cord into a power source of 110-120 volts, 50-60 cycles AC, or DC. If the unit does not operate on DC, reverse the position of the line cord plug in the outlet.

CAUTION: The line cord should never be plugged in when the bottom cover is not in place, except for servicing by qualified servicemen. Never use or test the unit on or near a grounded metal bench, radiator, sink, or other grounded metal object.

☐ Turn the OFF switch to the right, and observe if the tubes light. If the tubes do not light, remove the line cord from the power source and read the Servicing Hints. The tubes are wired in series, so if one doesn't light, the others also do not light. If the tubes light, go on to the next step.

☐ Turn on your radio and tune from 600 to 1500 kc to find a dial setting where no radio station is heard. Leave the radio dial at this setting.

☐ Connect a record player (or microphone) to your Wireless Broadcaster by plugging into the appropriate jack on the chassis. Turn the record player on and place the pickup arm on a record.

☐ Turn the Broadcaster's VOLUME control 2/3 of a full turn to the right.

☐ Use a screwdriver to adjust C-9, the FREQUENCY CONTROL capacitor, until the Broadcaster is heard at the radio. Now, turn down the VOLUME control at the Broadcaster, for comfortable listening.

If there is a howl or whistle in the radio, the frequency of the Wireless Broadcaster may be too close to that of a radio station. Set the receiver dial to another quiet setting, and retune C-9 for this new setting.

USE AS AN AMPLIFIER

Your Broadcaster can simultaneously be used as a complete phono amplifier and broadcaster, creating a pleasing dimensional effect. If you wish to use the unit as a phono amplifier only, just curl up the antenna, out of the way. To use as a phono amplifier:

☐ Connect any 3.2Ω to 16Ω speaker to the terminals marked SPEAKER on top of the chassis.

☐ Plug the phono cable from your record player into the appropriate jack on the amplifier.

☐ Turn on your amplifier and allow one minute warm-up.

☐ Place the pickup arm on a record. Adjust the amplifier VOLUME control for the desired listening level.

HOW TO CONNECT A PHONO PLUG

If you wish to connect a phono plug to your record player or microphone, see Figure 11.

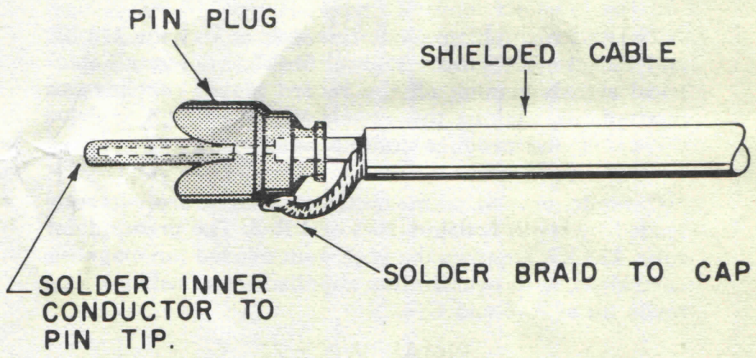


FIGURE 11. HOW TO CONNECT A PHONO PLUG

SERVICE HINTS

If your Wireless Broadcaster-Amplifier does not perform satisfactorily the first thing to do is to recheck all the wiring. (Be sure to remove the line cord plug from the power outlet before you remove the bottom plate to inspect the wiring.) Most cases of poor performance are caused by a wiring error, or the failure to use enough heat when soldering. If you have a friend who is familiar with electronics, he may find a mistake in the wiring that you have overlooked.

Occasionally the tubes fail to light because one has an open filament. Many radio or TV service shops will test your tubes free. The tubes are fully covered by Allied's guarantee, as listed in the next section.

Excessive hum can often be corrected by reversing the position of the line cord plug in the outlet.

HOW IT WORKS

The Wireless Broadcaster-Amplifier doubles as a phono amplifier and a miniature broadcasting station.

The phono amplifier section consists of V-1, the 12AX7, and V-2, the 50C5 tube. It amplifies the very small electrical signals coming off the record player cartridge or microphone, making the signals strong enough to drive a speaker and produce audible sound.

Ceramic, crystal or magnetic cartridges are correctly loaded by input resistors R-1 and R-2. The preamplifier tube, 12AX7, supplies the high gain needed for magnetic cartridges, with equalization supplied by a feedback loop made up of R-6 and C-4.

Output from the preamplifier stage is fed into the V-2 50C5 audio output tube which supplies ample power to drive a speaker and produce room-filling sound. The audio output transformer, T-1, matches a 3.2Ω to 16Ω speaker. The output level is adjusted by the R-9 VOLUME control which varies the signal voltage applied to the grid of the output tube.

As a wireless broadcaster, this unit operates much like a regular broadcasting station. It sends out a signal between 600 kc and 1500 kc which can be received by any standard radio.

The signal is made up of two parts. The first part is the desired sound signal, which is too low in frequency to be broadcast by itself. The second part is the carrier wave, on which the sound signal "rides". The carrier wave is the right frequency to be broadcast to your radio.

The carrier wave is produced by V-3, the 50C5 oscillator tube, and is sent out into the air at the antenna. V-3 oscillates because some of the tube output across L-1 and C-9 is fed back into the tube, in the correct phase to be amplified and fed back again. The needed phase shift is provided by L-1. These oscillations or waves, can be varied between 600 kc to 1500 kc by adjusting C-9.

The sound (audio) signal is impressed on the carrier wave at the plate of V-3. The plate voltage of V-3 varies at an audio rate because it is tied to the plate of V-2. V-2 doubles as an audio output and modulator tube, and amplifies the audio voltage to effect 75% modulation of the carrier wave.

Clean modulation is assured by the use of degenerative feedback across R-10. The amount of modulation can be varied by adjusting R-9, the VOLUME control.

ALLIED'S SERVICE FACILITIES

If the kit does not operate properly, we recommend the following:

Please write our Kit Department giving stock number and date of purchase of the kit. Also, describe fully what appears to be wrong. We may be able to determine a wiring error or a defective part.

This wired KNIGHT-KIT may be returned for inspection within one year after purchase, for a special service charge of $2.50. Parts within the standard EIA 90-day warranty period will be replaced without charge for the parts. A charge will be made for parts damaged in construction or because of a wiring error, or for parts which are beyond the 90-day warranty period. After the one-year period, service charges are based on the length of time required to repair the unit, plus the cost of any parts required.

PLEASE NOTE: KITS WIRED WITH ACID CORE SOLDER PASTE FLUXES OR IRONS CLEANED ON A SAL AMMONIAC BLOCK ARE NOT ELIGIBLE FOR REPAIR OR SERVICE AND WILL BE RETURNED TO YOU NOT REPAIRED, AT YOUR EXPENSE.

Allied's service facilities are primarily for inspection and trouble-shooting. Kits not completely wired, which require extensive work, will be returned collect with a letter of explanation.

If you return this kit, pack it well. To prevent damage in shipment, use a large enough carton so that cushioning material can be placed around the instrument. (Do not use the carton in which the kit was packed.) Cushion it well and tightly. Mark it: FRAGILE — DELICATE ELECTRONIC EQUIPMENT. Send the kit prepaid and insured. We will return the repaired kit to you C.O.D. as soon as repairs are completed. If you wish to save C.O.D. fees, your advance remittance may be enclosed for standard repair charges plus transportation costs. Any excess remittance will be refunded.

RESISTANCE CHART

All resistance measurements with respect to point B (terminal 1 of TS-3). Readings may vary ±20%, depending on the meter used. Remove line cord plug from power outlet before taking readings.

TUBE	PIN								
	1	2	3	4	5	6	7	8	9
V-1 12AX7	1M	2.7M	47K	0	1.5	1M	2.7M	47K	.9
V-2 50C5	330	0	100	160	0	2M	2M		
V-3 50C5	0	4.7K	44	100	4.7K	4.7K	2M		

ALLIED'S GUARANTEE ON KNIGHT-KITS

The designs and components selected for KNIGHT-KITS represent over a quarter of a century of experience in kit development. Allied extends these firm guarantees on KNIGHT-KITS.

We guarantee that the circuits of all KNIGHT-KITS have been carefully engineered and tested.

We guarantee that only high-quality components are supplied. All parts are covered by the standard EIA 90-day warranty. Any faulty components will be replaced prepaid and without charge if reported to us within the warranty period. We reserve the right to request the return of defective parts.

If your kit was damaged in a parcel post shipment, please write us at once, describing the condition in which the shipment was received. If your kit was part of a Railway Express shipment that was damaged in transit, please notify the Railway Express agent at once and then write us.

FCC CERTIFICATION

CUT OUT AND PASTE ON THE BOTTOM PLATE

Allied Radio Corp. certifies that the KNIGHT-KIT Wireless Broadcaster-Amplifier, 83Y706, meets FCC restricted radiation requirement for a low-power communication device under rule 15.204 when built according to the instruction manual and not more than 10 feet of wire is used as an antenna.

PARTS LIST FOR THE WIRELESS BROADCASTER-AMPLIFIER

Symbol Number	Description	Part Number
	CAPACITORS	
C-1	.01 μfd disc ceramic	276015
C-2	20 μfd tubular electrolytic	203200
C-3	.0047 μfd disc ceramic	276477
C-4	82 μμfd disc ceramic	296016
C-5	.01 μfd disc ceramic	276015
C-6	.0047 μfd disc ceramic	276477
C-7	470 μμfd disc ceramic	276478
C-8	100 μμfd disc ceramic	276017
C-9	FREQUENCY CONTROL, 30-220 μμfd variable mica	283001
C-10	20-20 μfd 150 v. tubular electrolytic	213201
	CONNECTORS	
J-1	Phono jack	502220
J-2	Phono jack	502220
	Phono plugs (2)	502123
	RESISTORS	
	All carbon, ½ watt, 10%, unless specified otherwise.	
R-1	820KΩ	301824
R-2	22KΩ	301223
R-3	2.7 megΩ	301275
R-4	220KΩ	301224
R-5	2.7 megΩ	301275
R-6	1.5 megΩ	301155
R-7	220KΩ	301224
R-8	47KΩ	301473
R-9	VOLUME control, 500KΩ, 20%, with switch S-1	390008
R-10	330Ω	301331
R-11	47KΩ	301473
R-12	4.7KΩ	301472
R-13	1KΩ, 1 watt	304102
R-14	27Ω, 1 watt	304270
R-15	33Ω	301330
	SELENIUM RECTIFIER	
SR-1	50 ma. selenium rectifier	620001

Symbol Number	Description	Part Number
	SWITCH	
S-1	ON-OFF switch	See R-9
	TERMINAL STRIPS	
TS-1	2-terminal strip	440201
TS-2	2-terminal strip	440201
TS-3	3-terminal strip	440303
TS-4	1-terminal strip	440101
TS-5	3-terminal strip	440303
	TRANSFORMER AND COIL	
T-1	Audio output transformer	102200
L-1	Oscillator coil	112200
	TUBES	
V-1	ECC83/12AX7 tube	611012
V-2	50C5 tube	610026
V-3	50C5 tube	610026

Description	Quantity	Part Number
	WIRE, SOLDER, AND SPAGHETTI	
Antenna wire, 10 ft.	1	805002
Bare wire, 4"	1	806004
Insulated solid wire:		
red	4	801002
orange	1	801003
yellow	3	801004
green	1	801005
blue	2	801006
violet	1	801007
Line cord	1	802001
Solder, 3 ft.	1	930002
Spaghetti, 12"	1	812009
	HARDWARE	
#4 self-tapping screws	4	562292
6-32 x 5/16" screws	18	560343
6-32 nuts	18	570340
3/8-32 nuts	2	570840
	MISCELLANEOUS	
Chassis	1	461207
Cover, bottom	1	463106
Feet, rubber	4	831001
Grommets, large	2	830200
Grommet, small	1	830001
Instruction Manual	1	750115
Knob	1	764202
Socket, 7-pin tube	2	501070
Socket, 9-pin tube	1	501090

TOOLS NEEDED FOR CONSTRUCTION

Stock Number	Description	Price*
46N852	Soldering pencil	$4.73
46N449	Long nose, side-cutting pliers	1.76
45N796	Screwdriver	.72
	TOOLS THAT MAKE CONSTRUCTION EASIER	
46N431	Diagonal cutting pliers	1.55
43N831	Set-screw screwdriver	.27
	ACCESSORIES YOU MAY WANT	
99S519	Crystal microphone	2.95
81D616	Speaker	1.40

*Price subject to change.

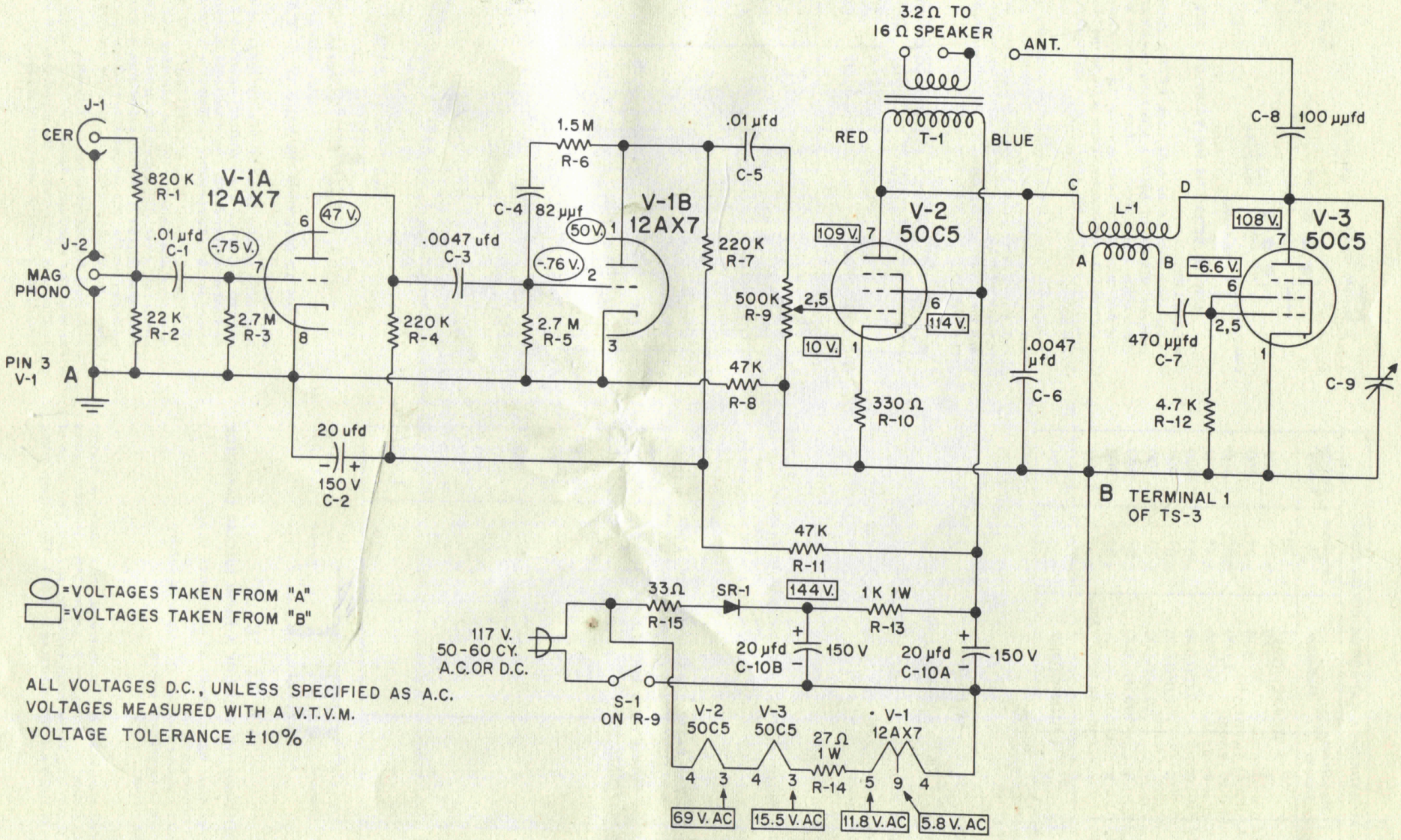
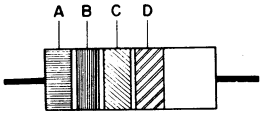


FIGURE 12. SCHEMATIC DIAGRAM

CAPACITOR AND RESISTOR COLOR CODE

RESISTOR-MICA CAPACITOR COLOR CODE				
Color	Significant Figures	Multiplier	Tolerance %	Voltage Rating*
Black	0	1	±20*	—
Brown	1	10	±1*	100
Red	2	100	±2*	200
Orange	3	1,000	±3*	300
Yellow	4	10,000	±4*	400
Green	5	100,000	±5*	500
Blue	6	1,000,000	±6*	600
Violet	7	10,000,000	±7*	700
Gray	8	100,000,000	±8*	800
White	9	—	±9*	900
Gold	—	.1	±5	1,000
Silver	—	.01	±10	2,000
None	—	—	±20	500

*Applies to capacitors only



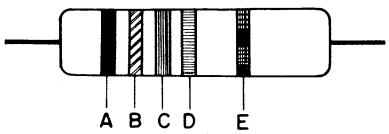
HOW TO DETERMINE THE VALUE OF A RESISTOR

A — First significant figure (digit) of resistance in ohms.
B — Second significant figure.
C — Decimal multiplier (number of zeros to be added).
D — Tolerance of resistor in percent. No color is 20%.

EXAMPLE:

A resistor has the following color bands: A, yellow; B, violet; C, yellow; and D, silver. The significant figures are 4 and 7 (47) and the multiplier is 10,000. The value of resistance is 470,000 ohms and the tolerance is ±10%.

TUBULAR PAPER CAPACITOR COLOR CODE				
Color	Significant Figures	Decimal Multiplier	Tolerance %	Voltage Rating (v d-c)
Black	0	1	±20	—
Brown	1	10	—	100
Red	2	100	—	200
Orange	3	1,000	±30	300
Yellow	4	10,000	—	400
Green	5	—	—	500
Blue	6	—	—	600
Violet	7	—	—	700
Gray	8	—	—	800
White	9	—	—	900
Gold	—	—	—	1,000
Silver	—	—	±10	—

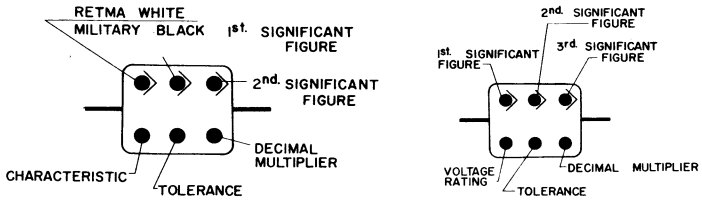


HOW TO DETERMINE THE VALUE OF A PAPER TUBULAR CAPACITOR

A — First significant figure (digit) of capacitance in $\mu\mu$f.
B — Second significant figure.
C — Decimal multiplier (number of zeros to be added).
D — Tolerance of capacitor in percent.
E — Voltage rating.

EXAMPLE:

A paper tubular capacitor has the following color bands: A, brown; B, green; C, orange; D, black; and E, yellow. The significant figures are 1 and 5 (15) and the decimal multiplier is 1,000. The value of capacitance is 15,000 $\mu\mu$f. The tolerance is ±20%. The voltage rating is 400 V DC.



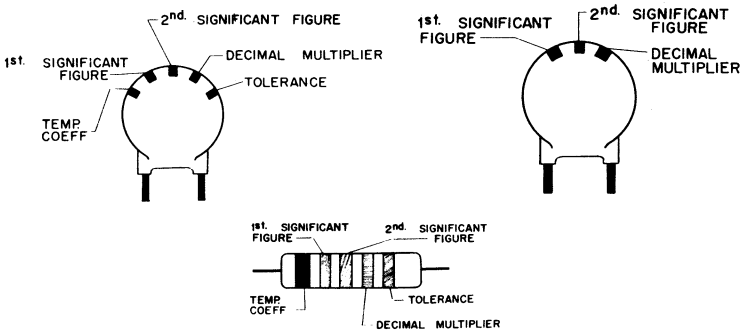
HOW TO DETERMINE THE VALUE OF A MICA CAPACITOR

EXAMPLES:

A capacitor with a 6 dot code (new RETMA standard REC-115A and military MIL-C-5A) has the following markings. Top row, left to right, white, green, brown; bottom row, right to left, brown, red, red. The first color white indicates mica. The significant figures are 5 and 1 (51), and the decimal multiplier is 10. So the capacitance is 510 $\mu\mu$f. Tolerance is ±2%. For most general applications the characteristic can be ignored.

A capacitor with a 6 dot code has the following markings: Top row, left to right, brown, orange, red; bottom row, right to left, brown, red, green. Since the first dot is neither black or white, this is the obsolete RETMA code. The significant figures are 1, 3, and 2 (132), and the decimal multiplier is 10. So the capacitance is 1320 $\mu\mu$f. Tolerance is ±2%. Voltage rating is 500 V DC.

CERAMIC CAPACITOR COLOR CODE					
			Tolerance		Temp. Coef. (Parts per million per °C.)
Color	Significant Figures	Decimal Figures	10$\mu\mu$f or less ($\mu\mu$f)	Over 10$\mu\mu$f (%)	
Black	0	1	±2.0	±20	0
Brown	1	10	±0.1	±1	−33
Red	2	100	—	±2	−75
Orange	3	1,000	—	±2.5	−150
Yellow	4	10,000	—	—	−220
Green	5	—	±0.5	±5	−330
Blue	6	—	—	—	−470
Violet	7	—	—	—	−750
Gray	8	0.01	±0.25	—	+150 to −1500
White	9	0.1	±1.0	±10	+100 to −750
Gold	—	—	—	—	—



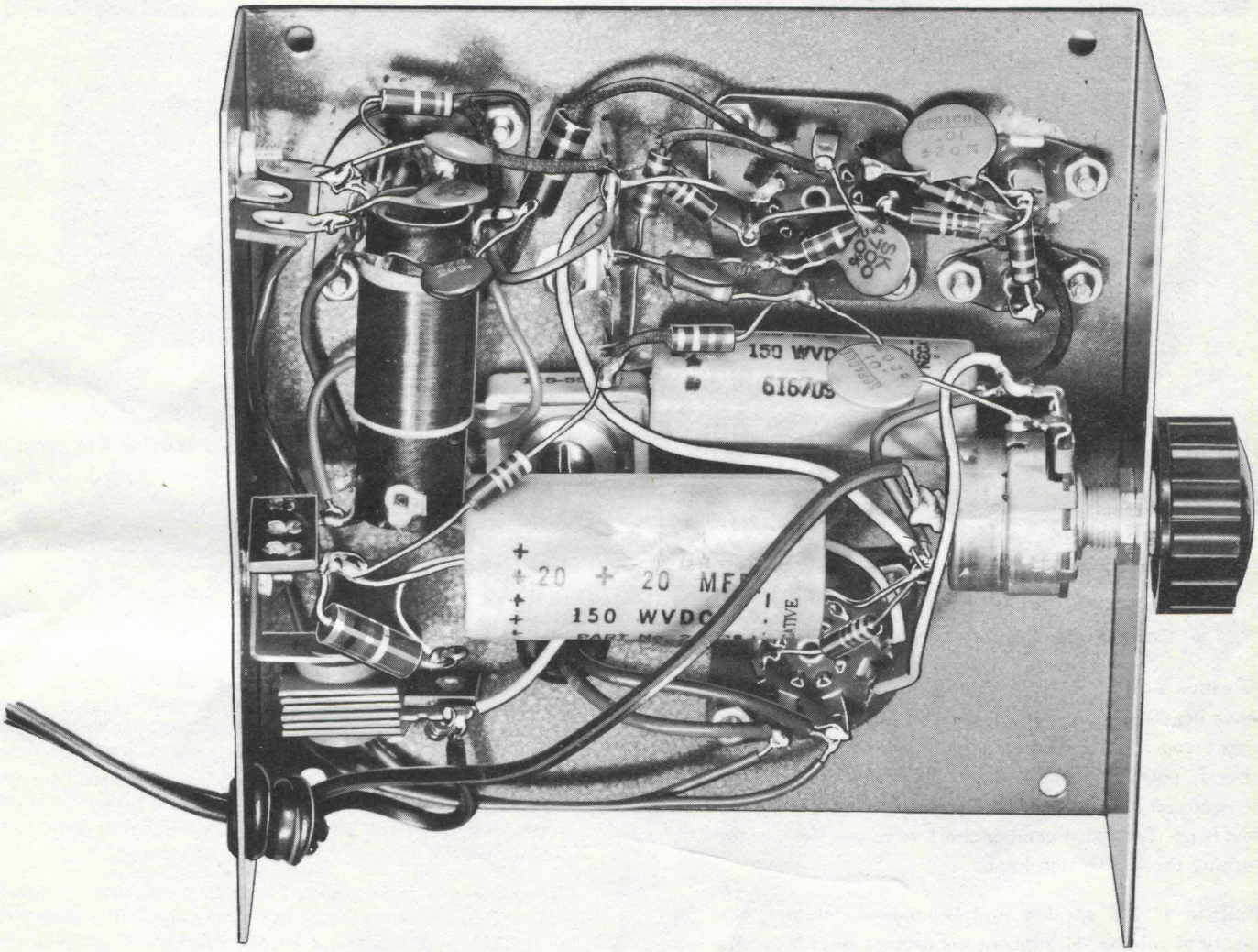
HOW TO DETERMINE THE VALUE OF A CERAMIC CAPACITOR

EXAMPLES:

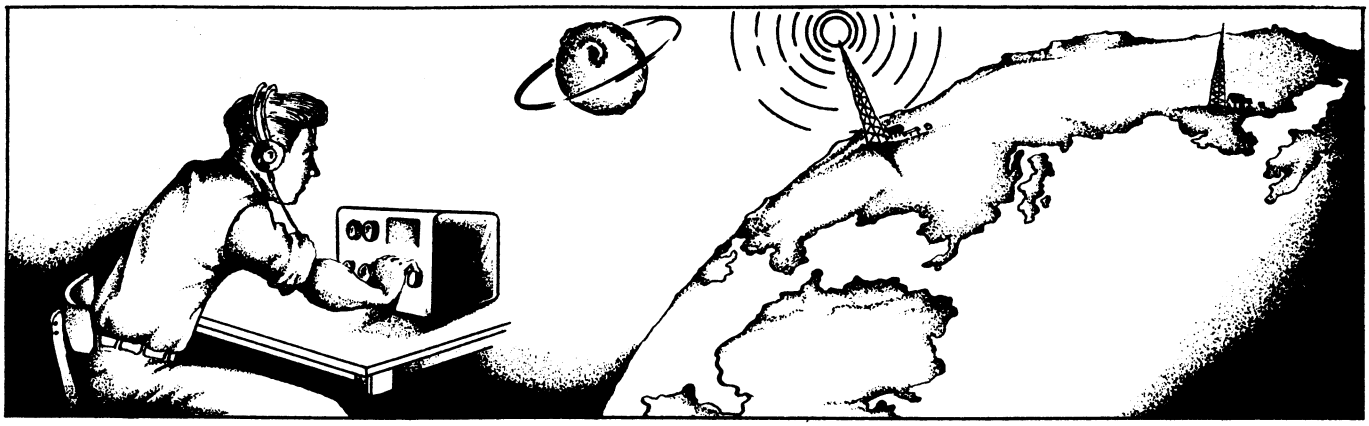
A ceramic tubular capacitor has the following color bands: Black, red, red, red, green. The significant figures are 2 and 2 (22), and the decimal multiplier is 100. The capacitance is, therefore, 2200 $\mu\mu$f. Tolerance is ±5%. Temperature coefficient is 0. Voltage rating is always 500 V.

A ceramic disc capacitor has the following 5-dot code: Red, brown, green, red, green. The significant figures are 1 and 5 (15), and the decimal multiplier is 100. The capacitance is, therefore, 1500 $\mu\mu$f. The tolerance is ±5%. The temperature coefficients — 75. Voltage rating is always 500 V.

A ceramic disc capacitor has the following 3-dot code: Green, brown, brown. The significant figures are 5 and 1 (51), and the decimal multiplier is 10. Therefore, the capacity is 510 $\mu\mu$f. Voltage rating is always 500 V and the tolerance is always — 0.


150 WVD
616705
+ 20 + 20 MF
150 WVDC

Popular knight-kits For SHORTWAVE



knight-kit "Space Spanner" Receiver Kit
Thrilling Shortwave And Broadcast Reception

83 Y 249

- **Built-in PM Speaker**
- **Sensitive Regenerative Circuit**
- **Standard and Short Wave Bands**
- **Convenient Bandswitching**

Sensitive 2-band receiver in easy-to-build kit form. Short wave band covers 6 to 18 megacycles — pulls in exciting foreign broadcasts from many parts of the world, plus Amateur, aircraft, police and marine radio. Specially designed regenerative circuit also provides highly sensitive reception on broadcast band. Broadcast band or short wave is selected simply by turning the bandswitch knob.

Built-in 4" PM speaker and beam-power output tube for plenty of volume. Headphone connectors on rear panel allow private, quiet listening; slide switch cuts out speaker. Sensitive circuit employs 12AT7 regenerative detector and audio amplifier; 50C5 power output; 35W4 rectifier. 6 controls allow precise, accurate tuning; Bandspread, Main Tuning, Antenna Trimmer, Bandswitch, Regeneration, and Volume. Panel is finished in attractive gray; has black knobs. Detailed, step-by-step instructions include pictorial and schematic diagrams. With all parts, punched chassis and tubes. Smart pyroxylin-covered, wood cabinet. Size, 7 x 10½ x 6". For 110-220 v., 50-60 cycle AC or DC. Shpg wt., 6½ lbs.

knight-kit "Ocean Hopper" Receiver Kit
Broadcast, Long Wave & Short Wave Reception

83 Y 749

- **High Sensitivity**
- **Full Frequency Coverage**
- **From 155 kc to 35 mc**
- **Step-By-Step Instructions**

An easy-to-put-together, top-performing receiver kit truly worthy of its name! Employs a highly sensitive, regenerative-type circuit for excellent performance. Excellent headphone reception; may also be used with any 3-4 ohm PM speaker on strong broadcast band stations. The "Ocean Hopper" is supplied with plug-in coil for covering standard broadcast band; covers long wave and popular short wave bands with coils listed below.

All controls are mounted on the front panel: Main Tuning, Bandspread, Antenna Tuning, and Off-On-Regeneration. Tubes: 12AT6 detector and 50C5 audio output; 35W4 rectifier. Gray panel and clearly marked lucite main tuning knob. Size, 6 x 9½ x 5". With all parts, cabinet, and instructions; less extra coils, headphones and speaker. Instructions include easy-to-follow pictorial and schematic diagrams. For 110-120 volts, 50-60 cycle AC or DC. Shpg. wt., 6½ lbs.

PLUG-IN COILS. Additional coils for greater frequency coverage. Shpg. wt., each, 3 oz.

Allied Stock No. 83 Y 741—Long Wave. 155-470 kc.
Allied Stock No. 83 Y 742—Short Wave. 1.65-4.1 mc.
Allied Stock No. 83 Y 743—Short Wave. 2.9-7.3 mc.
Allied Stock No. 83 Y 745—Short Wave. 7-17.5 mc.
Allied Stock No. 83 Y 744—Short Wave. 15.5-35 mc.

See your latest catalog for current prices.

KNIGHT-KITS ARE YOUR BEST BUY THE FINEST ELECTRONIC EQUIPMENT IN KIT FORM. CREATIVE ENGINEERING AND USE OF PREMIUM QUALITY PARTS ASSURE SUPERIOR PERFORMANCE. THAT'S WHY KNIGHT-KITS ARE SOLD WITH THIS EXCLUSIVE GUARANTEE: *EVERY KNIGHT-KIT MUST MEET PUBLISHED SPECIFICATIONS OR WE REFUND YOUR MONEY.*

KNIGHT-KITS ARE "CONVENIENCE ENGINEERED" RESISTORS ARE CARD MOUNTED AND IDENTIFIED. WIRE IS PRECUT. SMALL PARTS ARE PACKAGED IN SEE-THROUGH PLASTIC BAGS. DETAILS SUCH AS THESE AND STEP-BY-STEP INSTRUCTION MANUALS MAKE KNIGHT-KITS EASIEST TO BUILD.

KNIGHT-KITS ARE THE FIRST CHOICE OF EXACTING BUILDERS OF ELECTRONIC KITS EVERYWHERE AND HAVE BEEN SINCE THE EARLY 20's. THERE IS AN OUTSTANDING KNIGHT-KIT AVAILABLE FOR EVERY REQUIREMENT. EACH IS A REWARDING ADVENTURE IN KIT CONSTRUCTION. YOU WILL BE PROUD TO BUILD AND OWN A KNIGHT-KIT.

38K297-750115A-19-CA-360